SANTA BARBARA COUNTY
SHERIFF'S OFFICE
FORENSICS UNIT
FINGERPRINT SECTION

PROCESSING

1.0 Scope

This SOP provides general instructions for the processing of latent fingerprints on porous surfaces, non-porous surfaces, and special surfaces or conditions.

2.0 Definitions Porous Surfaces

- ***Sequential processing*** is the use of a series of development techniques in a specific order to maximize the development of friction 1idge detail. Determining the proper technique, or series of techniques, depends on several factors such as:
    1. Surface composition (porous or non-porous)
    2. Composition of the print medium
    3. Condition of the surface
    4. Presence of contaminants
    5. Detrimental effects of the procedure on the surface
    6. Other forensic analysis that may be required
- ***Porous surfaces*** are surfaces that are absorbent, such as untreated paper, cardboard, or raw wood.
- The reagents used on porous surfaces included are as follows:
    1. ***DFO*** (1, 8-Diazafluoren-9-one) reacts with amino acids to produce friction ridge detail with fluorescent properties when exposed to excitation wavelengths of 352-591 run.
    2. ***Ninhydrin*** reacts with amino acids to produce friction ridge detail purple in color.
    3. ***Physical developer*** is a silver physical development process that reacts with some components of friction ridge secretions, as well as fatty or oily contaminants.
    4. ***Silver nitrate*** reacts with salt to develop friction ridge detail.
- ***Non-porous surfaces*** are surfaces that are not absorbent, such as glass, metal, and plastics.
- The techniques used on non-porous surfaces included are as follows:
    1. ***Cyanoacrylate Ester (Superglue)*** is an adhesive used in a fuming method to develop friction ridge detail.
    2. ***Fluorescent dye staining*** is used to visualize cyanoacrylate fumed friction ridge detail.
    3. ***Rhodamine 6G*** is a dye that produces fluorescence when exposed to selected wavelengths of light.
    4. ***MBD {7-(P-Methoxybenzylamino-4Nitrobenz-2-0xa-1, 3-Diazole)]*** is a yellow dye stain which produces a fluorescent product when exposed to selected wavelengths of light.
    5. ***Ardrox*** is a fluorescent yellow dye used with UV light.
    6. ***Fingerprint powders*** are powders used to visualize friction ridge detail, which can be magnetic, non-magnetic, fluorescent, hi-chromatic, or a variety of mono-chromatic types.
- ***Special surfaces or conditions*** are surfaces such as:

1. Semi-porous surfaces, such as glossy coated paper, or items that are comprised of both
2. Porous and non-porous surfaces, such as a glass or plastic bottle with a paper label,
3. Items that are or have been wet,
4. Latent prints that have been deposited in blood,
    - **LCV (Leucocrystal Violet)**
    - **Amido Black**
5. Surfaces contaminated with food, or
6. Adhesive surfaces
    - **Crystal or Gentian violet**, a violet stain used to develop or enhance friction ridge detail, which can be viewed by either fluorescence or non-fluorescence.
    - **Sticky Side Powder™,** a commercially prepared product used to develop friction ridge detail on adhesive surfaces and tapes.

3.0 Sequential Processing

A. The first step in any sequential processing procedure is to visually examine the item. The reasons for a visual examination are:
    1. To detect the presence of visible (patent) or plastic (three dimensional) prints
    2. To identify the factors mentioned above in order to determine the proper technique, or sequence of techniques to apply.

B. The next step may be to examine the item under an alternate light source in order to detect:
    1. Latent prints with properties of luminescence resulting from selected wavelength illumination without chemical treatment, and
    2. The fluorescent properties of the item itself.

C. The subsequent steps in the processing of an item are outlined in this manual, and are arranged according to surface type and special conditions. Each section provides guidelines on the application of reagents or techniques and the sequence of application. Not all reagents or techniques must be applied to every item in every case. The selection of the reagent or technique and the sequence of application shall be determined by the individual analyst trained to competency.

3.1 Order of Sequential Processing

This list describes the general guidelines for the sequential processing of porous surfaces.

1 Visual examination
2 Inherent luminescence (if applicable)
3 Examination using the RUVIS SceneScope
4 Application of reagent(s) for porous surfaces
- Use the list below as a guide in determining the appropriate reagent to apply.

Dark or multicolored item,	apply DFO
Light colored paper with handwriting in ink,	Ninhydrin
Plain cardboard	Ninhydrin
Wet or has been wet	Physical developer
Raw untreated wood	Ninhydrin or Silver nitrate

5 Application of dry heat (DFO) or heat and humidity (Ninhydrin)

6 Examine with alternate light source (if applicable)
7 Analyze latent prints developed and mark any latent prints suitable for comparison.
8 Photograph or digitally capture the latent prints.

3.2 Sequential processing of non-porous surfaces

A. This describes the general guidelines for the sequential processing of non-porous surfaces:
    1. Visual examination
    2. Inherent luminescence (if applicable)
    3. Examination using the RUVIS SceneScope
    4. Cyanoacrylate ester (Superglue) fuming
    5. Application of fluorescent dye stain
    6. Alternate light source
    7. Application of fingerprint powder
    8. Analyze latent prints developed
    9. Lift, photograph, or digitally capture all latent prints suitable for comparison.

3.3 Sequential Processing for Special Surfaces

A. Sequential processing: Semi-porous or combination surfaces
    1. The sequential processing procedure for semi-porous surfaces, or surfaces that are comprised of both porous and non-porous surfaces is as follows:
        a. Apply the sequence for non-porous surfaces, and then
        b. Apply the sequence for porous surfaces.

B. Sequential processing: Non-porous wet surfaces
    1. The sequential processing procedure for non-porous surfaces that are or have been wet is as follows:
        a. Allow the surface to dry and apply the sequence for non-porous surfaces or
        b. Process the item while wet with ***Small Particle Reagent***, a suspension of molybdenum disulfide that adheres to fats and oils.

C. Sequential processing: Porous wet surfaces
    1. The sequential processing procedure for porous surfaces that are or have been wet is the application of Physical Developer.

D. Sequential processing: Blood prints
    1. The sequential processing procedure for prints that have been deposited in blood is as follows:
        a. If the surface is porous or semi-porous, then apply Leucocrystal violet or Ninhydrin.
        b. If the surface is non-porous, then apply Leucocrystal violet or Amido black, a blue-black protein stain. Amido black can be used after LCV.

E. Sequential processing: Food contaminated surfaces
    1. The sequential processing procedure for prints that have been deposited in food contaminated surfaces is as follows:
        a. Apply Sudan black, a black dye that stains fats, oils, sebaceous components, and contaminants of friction ridge residue, or
        b. Cyanoacrylate fume the item and then apply Sudan black.

F. Sequential processing: Adhesive surfaces
    2. The sequential processing procedure for adhesive surfaces is as follows:

a. If the non-adhesive side is porous, apply the appropriate technique for porous surfaces.
b. If the non-adhesive side is non-porous, fume the item with cyanoacrylate while protecting the adhesive side.
c. Apply one of the following to the adhesive side:
    - **Crystal or Gentian violet**, a violet stain used to develop or enhance friction ridge detail, which can be viewed by either fluorescence or non-fluorescence.
    - **Sticky Side Powder™**, a commercially prepared product used to develop friction ridge detail on adhesive surfaces and tapes.
d. After processing the adhesive side, process the non-adhesive side with dye stain (except for "Scotch" type tape) and powder if applicable. Some tapes (similar to electrical or duct tape) may be processed on both the adhesive and non-adhesive side by Cyanoacrylate fuming and dye staining.
e. If the adhesive item needs to be removed from a surface, apply **UN-DU®**, a product that temporarily neutralizes adhesives, as follows:
    - Place a couple of drops of **UN-DU®** at the end of the tape, or on top of porous tapes.
    - Begin pulling and separating the tape from the substrate until the tape is sufficiently removed to continue with latent print processing.
    - Add drops sparingly as separation becomes more difficult as the **UN-DU®** evaporates.

4.0 Reagent Checks

See FP007, Quality Control, for documentation of reagents and controls.

5.0 Processing Materials and Equipment

A. Materials and equipment needed are as follows:
1. Trays
2. Tongs, tweezers, brushes, or pipettes
3. Sprayer or mister
4. Drying rack
5. Dry heat source
6. Heat and humidity source
7. Photographic or digital imaging equipment
8. Small Particle Reagent materials and equipment
    a. Spray bottles
    b. Lifting tape
    c. Lift cards
9. Amido Black materials and equipment
    a. Rinse bottles
    b. Tray
10. Leucocrystal violet materials and equipment
    a. Tray or aerosol (spray) bottle
    b. Tongs or forceps

c. Tissues or paper towels
d. Alternate light source

11. Sudan Black materials and equipment
    a. Dish or rinse bottles
    b. Tray
    c. Tongs or forceps
12. Adhesive surfaces materials and equipment
    a. Glass dish, bowl, tray, shallow jar
    b. Weigh boat or container
    c. Spoon or glass rod
    d. Camel hair or soft brush
    e. Tongs
13. Fluorescent dye staining materials, equipment, and reagents
14. Alternate light source, or UV light source
15. Fingerprint powder materials and equipment
    a. Fingerprint powders
    b. Powder applicator (i.e., fiberglass, magnetic wand, feather brush)
    c. Latent lifting tape or other lifting medium
    d. Latent lift cards
    e. Casting material
16. Cyanoacrylate (Superglue) fuming materials and equipment
    a. Fuming chamber
    b. Heat source (e.g. hot plate)
    c. Aluminum foil or weigh boat
    d. Humidity device (e.g. beaker of hot water)
17. Miscellaneous laboratory equipment
18. Photographic equipment

B. Chemical/ Safety

1. Analysts shall prepare and apply the solutions under a fume hood while wearing the appropriate level of personal protective equipment.
2. Solvents used in the preparation of these reagents are flammable.
3. Silver nitrate is corrosive, toxic, and will stain the skin.
4. Leucocrystal violet and Sudan black are very toxic if swallowed, inhaled, or absorbed through the skin.
5. Necessary precautions should be taken to prevent exposure to the biological hazards associated with blood.
6. Cyanoacrylate fumes irritate the mucous membranes, and in the glue form, will bond skin to skin and skin to other objects very rapidly. Appropriate personal protective equipment should be worn when handling liquid glue. Cyanoacrylate fuming chambers must be adequately vented prior to opening.
7. Fluorescent dye stains are to be prepared and applied in properly ventilated fume hoods. Solvents used in the preparation of these reagents are flammable, harmful when inhaled, and may cause serious injury if ingested.

8. Fingerprint powders are relatively safe; however, the inhalation of fingerprint powder and fiberglass brush particles should be avoided. In the absence of a down draft venting system, a particulate respirator (dust mask) should be worn.

C. Preliminary Considerations

1. As with all items of evidence, consideration for other forensic evidence must be taken into account when determining the processing techniques used to develop latent prints
    a. If DNA analysis is requested, limit cross-transfer, contamination, and deleterious change of the evidence by
        - Wearing a clean lab coat, gloves, and a mask
        - Changing gloves and butcher paper on the work area between cases
        - Using a new fingerprint brush and powder from a dedicated "clean jar" placed in a weigh boat or clean paper for application
        - Not using **UN-DU®** to remove tape affixed to surfaces
        - Limiting rinsing of tapes and blood prints
        - Placing only evidence from one case in the CAE fuming chamber during a run cycle
        - Limiting rinsing of dye stains
    b. When practicable, make machine copies/take photographs/or obtain scanned images of items that
        - Contain handwriting
        - Are not mass produced
        - May be adversely effected by the process (i.e. thermal paper)
2. Blood print may need to be "fixed" by immersing the item in methanol for one hour or by applying heat.
3. Some of the fluorescent dye stains may cause damage to the surface of an item depending on the solvent used. If damage to the surface is of concern, an alternative formula may be used, such as Ardrox formula 3 in place of formula 2 where the methanol may adversely react with the surface (e.g., paint, varnish, etc.).

6.0 Fingerprint Powder procedures

A This describes the procedure for applying fingerprint powder:

1. Select the appropriate powder. Various colors of powders, bi-chromatic powder, fluorescent powders, magnetic powders, and spray powders are allowed.
2. Apply a light amount of powder gently over the surface with a brush or applicator.
3. When friction ridges start to appear, brush in the direction of the ridge flow to avoid smearing the powder and residue into the furrows.
4. Continue to apply powder until the print is fully developed.
5. Gently brush the surface clear of excess powder.
6. Analyze latent prints developed and mark any latent prints suitable for comparison.
7. Photograph or lift any usable latent prints developed.

7.0 Cyanoacrylate (Superglue) fuming procedures

A This describes the procedure for fuming non-porous items:

1. Suspend or place items in the fuming chamber.
2. Place a test print control in the fuming chamber with evidence items.
3. Apply sufficient amount of cyanoacrylate to the aluminum foil or weigh boat.
   Note: Amount of cyanoacrylate will be dependent on equipment performance analysis results.
4. Place sufficient water in the humidity device.
5. Secure the fuming chamber door.
6. Turn on the heat source.
7. Prior to opening chamber door to remove items, make sure all fumes have been adequately vented.
8. Analyze latent prints developed and mark any latent prints suitable for comparison.
   Note: If reprocessing poor quality cyanoacrylate prints, use half the amount of cyanoacrylate at a shorter interval. Go to step 4.
9. Photograph any usable latent prints developed, if applicable.

8.0 DFO (1, 8-Diazofluoren-9-one)

8.1 DFO Materials and Reagents

Note: Commercially prepared, purchased reagents may be used as long as the reagent has passed a quality control check. Follow the directions supplied by the vendor.

A. The following is a list of chemicals used in preparing DFO solutions.
   1. DFO (1,8-Diazofluoren-9-one)
   2. Methanol
   3. Acetic acid
   4. 2-Propanol (Isopropyl alcohol)
   5. Acetone
   6. Xylene
   7. Petroleum ether
   8. Ethanol
   9. Heptane

8.2 Reagent preparation- Petroleum ether stock solution

A. Follow the steps below to prepare the DFO Petroleum ether stock solution (200 mL):
   1 gram DFO
   180 mL methanol
   20 mL acetic acid

   1. Dissolve DFO in methanol using a magnetic stirrer
   2. Add acetic acid
   3. Store the solution in a dark colored bottle

8.2.1 Reagent preparation- Petroleum ether: Working solution A

A. Follow the steps below to prepare the DFO Petroleum ether Working Solution A (1 Liter):

10 mL 2-propanol (isopropyl alcohol) 50
mL acetone
50mLxylene
60 mL DFO stock solution 830
mL petroleum ether

1. Add 2-propanol (isopropyl alcohol) to a 1liter flask
2. Stir in acetone
3. Stir in Xylene
4. Stir in the DFO stock solution
5. Stir in petroleum ether
6. Make sure a QC check has been performed on the current batch of reagent *(Expected results: fluorescence)*
7. Store the solution in a dark colored bottle

8.2.2 Reagent preparation - Petroleum ether: Working solution B

A. Follow the steps below to prepare the DFO Petroleum ether Working Solution B (1 Liter):

50 mL acetone
50 mL Xylene
60 mL DFO stock solution 840
mL petroleum ether

1. Add acetone to a 1 liter flask
2. Stir in Xylene
3. Stir in DFO stock solution
4. Stir in petroleum ether
5. Make sure a QC check has been performed on the current batch of reagent *(Expected results: fluorescence)*
6. Store the solution in a dark colored bottle

8.3 Reagent preparation - Heptane Solution

A. Follow the steps below to prepare the DFO heptane solution (1 Liter):

0.5 grams DFO
80 mL ethanol
40 mL acetic acid 880
mL heptane

1. Dissolve DFO crystals in ethanol using a magnetic stirrer
2. Stir in acetic acid
3. Stir in heptane
4. Perform a quality control check *(Expected results: fluorescence)*
5. Store the solution in a dark colored bottle

8.4 DFO procedures

A. This describes the procedure for applying DFO:

1. Make sure a QC check has been performed on the current batch of reagent
2. Pour the DFO solution into a clean shallow tray
3. Using tweezers or tongs, immerse the item in the solution for approximately 5 to 10 seconds. If the item cannot be immersed, the solution may be applied by:
    a. brushing,
    b. pipetting, or
    c. spraying
4. Allow the item to dry thoroughly
5. Repeat steps 2 and 3
6. Apply heat for approximately 10 to 20 minutes
7. Examine with alternate light source
8. Analyze latent prints developed and mark any latent prints suitable for comparison.
9. Photograph or digitally capture the latent prints.

9.0 Ninhydrin

Note: Commercially prepared, purchased reagents may be used as long as the reagent has passed a quality control check. Follow the directions supplied by the vendor.

History note: Since it was introduced in 1954, Ninhydrin has been the most widely used chemical technique for processing porous evidence (papers, cardboard). Ninhydrin chemically reacts with amino acids to produce a dark purple product known as Ruhemann's Purple (RP). Ninhydrin has developed latent prints known to be over 30 years old.

Chemistry note: Amino acid components of a latent print are stable compounds that will attach themselves to the cellulose of a paper product. The amino acids will not migrate (as do fats and lipids – a concern in Iodine fuming) over a period of time or as long as the paper remains dry. Amino acids are water soluble, therefore, Ninhydrin would not be the proper technique if the porous evidence was wet or exposed to high humidity or fog over a period of time. (See section on Physical Developer for processing evidence that is or was wet). Different solvent systems of Ninhydrin are available, including hexanes, petroleum ether and acetone.
Hexanes- limited ink run, moderate expense, flammable (addressed this SOP)
Petroleum Ether- limited ink run, moderate expense, highly flammable.
Acetone - will cause inks to run, inexpensive, flammable

9.1 Ninhydrin Materials and reagents

A. The following is a list of chemicals used in preparing Ninhydrin solutions.

1. Ninhydrin crystals
2. n-Hexane or Hexanes
3. Ethanol
4. Acetic acid

9.2 Reagent preparation- Hexane solution

A. Follow the steps below to prepare the Ninhydrin hexane solution in a fume hood:

25 grams Ninhydrin
crystals 100 mL ethanol
25 mL acetic acid
1000 mL n-hexane or hexanes

Stock solution:

1. Dissolve Ninhydrin crystals in ethanol using a magnetic stirrer
2. Add acetic acid, continue stirring until dissolved

Working solution:

3. Add 30 mL stock solution from above to 1 L n-hexane. Stir using magnetic stirrer until well blended and a clear light yellow solution is attained (~30 mins.).
4. NOTE: A dark yellow oily substance may appear at the bottom of the bottle that may cause inks to "feather" or blur. Use the working solution as needed until the oily substance is reached, then pour or pipette this substance out and discard it. Perform a quality control check *(Expected results: purple color change)*
5. Store the solution in a dark colored bottle

9.3 Ninhydrin procedures

A. This describes the procedure for applying Ninhydrin:
   1. Make sure a QC check has been performed on the current batch of reagent
   2. Pour the Ninhydrin solution into a clean shallow tray
   3. Using tweezers or tongs, immerse the item in the solution for approximately 5 seconds. If the item cannot be immersed, the solution may be applied by:
      a. Brushing,
      b. Pipetting, or
      c. Spraying (spraying should be a last resort - safety reasons)
   4. Allow the item to dry thoroughly
   5. Allow to develop in the dark for 24-72 hours. Heat and humidity may be applied to speed up the development, but use caution as they may develop increased background noise.
   6. Analyze latent prints developed and mark any latent prints suitable for comparison.
   7. Photograph or digitally capture the latent prints. Ninhydrin developed latent prints will fade over time, so they must be photographed to preserve them.

10.0 Physical Developer

Note: Commercially prepared, purchased reagents may be used as long as the reagent has passed a quality control check. Follow the directions supplied by the vendor.

10.1 Physical Developer Materials and Reagents

A. The following is a list of chemicals used in preparing the Physical Developer solutions:
   1. Maleic acid
   2. Distilled water

3. Commercially prepared Physical Developer solutions
4. n-Dodecylamine acetate
5. Synperonic N
6. Silver nitrate
7. Ferric nitrate
8. Ammonium ferrous sulfate
9. Citric acid

10.1.1 Reagent preparation-Maleic acid pre-wash

A. Follow the steps below to prepare the maleic acid pre-wash:

25 grams maleic acid
1 L distilled water

1. Dissolve maleic acid in distilled water
2. Pour into tray

10.1.2 Reagent preparation- Commercially prepared solution

A. Follow the manufacturer's specifications in preparing the Physical Developer solution. For example:

Forensic Research & Supply Corporation
25 mL Silver nitrate (Solution A)
450 mL Physical Developer (Solution B)

1. Add Solution A to Solution B (Measured quantities are 5 mL Solution A to every 90 mL Solution B for a working ratio of 18:1)
2. Pour into tray

Perform a quality control check (Expected results: silver-gray deposit)

10.1.3 Reagent preparation- Laboratory prepared stock solution

A. Follow the steps below to prepare the Physical Developer stock solution:

1 L distilled water
4 grams n-dodecylamine acetate
4 grams Synperonic N

1. Combine distilled water and n-dodecylamine acetate in a 2 L glass beaker
2. Add Synperonic N and stir for 30 minutes with a magnetic stirrer
3. Transfer the solution to a bottle
4. Wait 24 hours until all solid particles have settled before making the working solution (Note: The stock solution will keep indefinitely)

10.1.4 Reagent preparation- Laboratory prepared Silver nitrate solution

A. Follow the steps below to prepare the Physical Developer Silver nitrate solution:

50 mL distilled water
10 grams silver nitrate

1. Dissolve silver nitrate in distilled water in a clean 100 mL glass beaker
2. Place beaker in a dark place until needed

10.1.5 Reagent preparation- Laboratory prepared working solution

A. Follow the steps below to prepare the Physical Developer working solution:

900 mL distilled water
30 grams ferric nitrate
80 grams ammonium ferrous sulfate
20 grams citric acid
40 mL stock solution

1. Add distilled water to a 2 liter glass beaker
2. Add ferric nitrate
3. Add ammonium ferrous sulfate
4. Add Citric acid
5. Stir until dissolved and then stir for an additional 5 minutes
6. Add stock solution and stir for 2 minutes
7. Add the silver nitrate solution and stir for 2 minutes
8. Pour into tray
9. Make sure a QC check has been performed on the current batch of reagent (Expected results: silver-gray deposit)

10.2 Physical Developer procedures

A. This describes the procedure for processing with Physical Developer:

1. Make sure a QC check has been performed on the current batch of reagent.
2. Lay out three trays, one for each of the following:
    a. Maleic acid pre-wash
    b. Physical developer working solution
    c. Rinse water

Note: ***Extremely clean glassware is essential when mixing solutions and processing evidence.***

3. Fill each tray with enough liquid to cover the item
4. Immerse the item in the maleic acid pre-wash for 10 minutes, or until bubbles stop coming from the article, whichever takes longer
5. Immerse the item in the Physical Developer Working Solution while gently rocking the tray or use a mechanical rocker
6. Remove the item when the background surface appears significantly darker or until 20 minutes has elapsed
7. Place the item in a tray and rinse in cold tap water for 10 minutes
8. Remove the item from the rinse, lay it item flat, and allow it to dry thoroughly
9. Repeat steps 3 through 8 if needed
10. Analyze latent prints developed and mark any latent prints suitable for comparison.
11. Photograph or digitally capture the latent prints.

11.0 Silver Nitrate

Note: Commercially prepared, purchased reagents may be used as long as the reagent has passed a quality control check. Follow the directions supplied by the vendor.

11.1 Silver Nitrate Reagents

A. The following is a list of chemicals used in preparing the Silver nitrate solution:
1. Silver nitrate crystals
2. Distilled water
3. Ethanol

11.2 Reagent preparation -Ethanol solution

A. Follow the steps below to prepare the Silver Nitrate Ethanol solution:
30 grams silver nitrate crystals
30 mL distilled water
1 liter ethanol

1. Dissolve silver nitrate crystals in distilled water in a one-gallon dark colored bottle.
2. Add ethanol and mix
3. Make sure a QC check has been performed on the current batch of reagent *{Expected results: silver-gray color change)*
4. Store the solution in a dark colored bottle

11.3 Reagent preparation- Distilled water solution

A. Follow the steps below to prepare the silver nitrate distilled water solution:
30 grams silver nitrate crystals
1 liter distilled water

1. Dissolve silver nitrate crystals in distilled water in a one-gallon dark colored bottle.
2. Make sure a QC check has been performed on the current batch of reagent *(Expected results: silver-gray color change)*
3. Store the solution in a dark colored bottle

11.4 Silver nitrate procedures

A. This describes the procedure for applying silver nitrate:
1. Make sure a QC check has been performed on the current batch of reagent
2. Pour the silver nitrate solution into a clean shallow tray
3. Using tweezers or tongs, immerse the item in the solution for approximately 5 seconds. If the item cannot be immersed, the solution may be applied by:
    a. Brushing,
    b. Pipetting, or
    c. Spraying
4. Allow the item to dry

5. Expose the item to a strong UV light until prints develop, background surface darkens, or for approximately 1 hour.
6. Monitor the item closely during this time as prints may develop at different rates
7. Analyze latent prints developed and mark any latent prints suitable for comparison.
8. Photograph or digitally capture the latent prints.
9. Store the evidence in the dark to stop the development process

12.0 RAM (Rhodamine 6G, Ardrox, MBD)

Note: Commercially prepared, purchased reagents may be used as long as the reagent has passed a quality control check.

12.1 Rhodamine 6G Materials and Reagents

A. The following is a list of chemicals used in preparing Rhodamine 6G solution:
1. Rhodamine 6G
2. Methanol

12.1.1 Reagent preparation - Stock solution

A. Follow the steps below to prepare the Rhodamine 6G stock solution:
1 g Rhodamine 6G
10 L methanol

1. Dissolve Rhodamine 6G in methanol

12.1.2 Reagent preparation- Working solution

A. Follow the steps below to prepare the Rhodamine 6G working solution:
100 mL stock solution per 900mL methanol

1. Mix stock solution with methanol
2. Perform a quality control check *(Expected results: fluorescence)*
3. Store in an appropriate container

12.2 MBD

Note: Commercially prepared, purchased reagents may be used as long as the reagent has passed a quality control check.

12.2.1 Materials and Reagents

A. The following is a list of chemicals used in preparing MBD solutions:
1. MBD [7-(P-Methoxybenzlamino-4Notrobenz-2-0xa-1,3-Diazole)]
2. Acetone

3. Methanol
4. 2-Propanol (Isopropyl Alcohol)
5. Pentane
6. Petroleum ether

12.2.2 Reagent preparation -Pentane solution

A. Follow the steps below to prepare the MBD Pentane solution:

.03 gram MBD
15 mL acetone
40 mL methanol
15 mL 2-propanol (isopropyl alcohol)
930 mL pentane

1. Dissolve MBD in Acetone
2. Add methanol and 2-Propanol and stir
3. Add petroleum ether and stir briefly
4. Make sure a QC check has been performed on the current batch of reagent *(Expected results: fluorescence)*
5. Store in an appropriate container

12.3 Ardrox

Note: Commercially prepared, purchased reagents may be used as long as the reagent has passed a quality control check.

12.3.1 Materials and Reagents

A. The following is a list of chemicals used in preparing Ardrox solutions:

1. Ardrox
2. Methanol
3. Acetone
4. Water

12.3.2 Reagent preparation- Formula 1 (water rinse)

A. Follow the steps below to prepare the Ardrox Formula 1 solution:

2mLArdrox
100 mL methanol

1. Combine Ardrox and methanol
2. Perform a quality control check *(Expected results: fluorescence)*
3. Store in an appropriate container

12.3.3 Reagent preparation- Formula 2 (no rinse)

A. Follow the steps below to prepare the Ardrox Formula 2 solution:

2 mL Ardrox
10 mL acetone
988 mL methanol

1. 1. Combine Ardrox, acetone, and methanol
2. Make sure a QC check has been performed on the current batch of reagent *(Expected results: fluorescence)*
3. Store in an appropriate container

12.3.4 Reagent preparation- Formula 3 (Water rinse)

A. Follow the steps below to prepare the Ardrox Formula 3 solution:

2mL Ardrox
98 mL water

1. Combine Ardrox and water
2. Make sure a QC check has been performed on the current batch of reagent *(Expected results: fluorescence)*
3. Store in an appropriate container

12.4 Fluorescent dye staining procedures

A. This describes the procedure for applying a fluorescent dye stain:

1. Apply the fluorescent dye stain to the cyanoacrylate fumed test print control and examine it with an alternate light source prior to applying the dye stain to evidence items.
2. Apply the dye solution to the fumed evidence using a wash bottle.
3. Rinse off the excess dye using a wash bottle
    a. Methanol is used for rinsing Rhodamine 6G dye stain
    b. Water is used for rinsing Ardrox Formula (1) and (3) dye stain
    c. MBD and Ardrox Formula (2) do not require a rinse
4. Allow the evidence to thoroughly dry. If the dye is still wet, its fluorescence may obscure the fluorescence of the latent print.
5. Examine with an alternate light source.
6. Analyze latent prints developed and mark any latent prints suitable for comparison.
7. Photograph any usable latent prints developed.

13.0 Small Particle Reagent (SPR) Materials and Reagents

Note: Commercially prepared, purchased reagents may be used as long as the reagent has passed a quality control check.

13.1 Small Particle Reagent (SPR) Materials and Reagents

A. The following is a list of chemicals used in preparing Small Particle Reagent solution:

1. Molybdenum disulfide

2. Water
3. "Photo Flo"

13.2 Reagent preparation -Small Particle Reagent (SPR)

A. Follow the steps below to prepare the Small Particle Reagent solution:
30 grams molybdenum disulfide
1 L water
1 drop "Photo Flo"

1. Add "Photo Flo" to the distilled water
2. Add molybdenum disulfide and mix
3. Pour into a spray bottle with an adjustable nozzle or a dish
4. Perform a quality control check *(Expected results: silver-gray deposit)*

13.3 Small Particle Reagent (SPR) procedures

A. This describes the procedure for applying Small Particle Reagent:
1. Mix the reagent just prior to application to avoid settling of the particles.
2. Make sure a QC check has been performed on the current batch of reagent.
3. Spray the reagent over the surface of the item.
4. Continually shake the spray bottle during application.
5. Rinse with clear water.
6. If dipping, immerse the item in the reagent while agitating the dish.
7. Analyze latent prints developed and mark any latent prints suitable for comparison.
8. Photograph or digitally capture the latent prints.

14.0 Amido Black

Note: Commercially prepared, purchased reagents may be used as long as the reagent has passed a quality control check.

14.1 Amido Black Materials and Reagents

A. The following is a list of chemicals used in preparing amido black solutions:
1. Naphthalene Black 12B
2. Methanol
3. Glacial acetic acid
4. Distilled water
5. 5-Sulfosalicylic acid
6. Amido 1OB black
7. Sodium carbonate
8. Formic acid
9. Kodak "Photo-Flo"

14.2 Methanol Based Amido Black Reagent preparation

A. Follow the steps below to prepare the amido black solution:
1g Naphthalene Black 12B
450 mL methanol
50 mL acetic acid

1. Place Naphthalene Black 12B into a 11iter glass beaker
2. Add methanol
3. Add acetic acid
4. Stir with a magnetic stirrer for 30 minutes
5. Perform a quality control check *(Expected results: blue-black color change)*
6. Transfer to a 1 liter bottle with a secure cap

14.2.1 Reagent preparation- Methanol rinse

A. Follow the steps below to prepare the Amido Black methanol rinse:
900 mL methanol
100 mL acetic Acid

1. Pour methanol into a glass beaker
2. Add the acetic acid
3. Transfer to a 1liter bottle with a secure cap

14.2.2 Reagent preparation- Distilled water rinse

A. Follow the steps below to prepare the amido black distilled water rinse:
950 mL distilled water
50 mL acetic acid

1. Pour distilled water into a glass beaker
2. Add the acetic acid
3. Transfer to a 1liter bottle with a secure cap

14.2.3 Methanol based amido black procedures

A. This describes the procedure for applying Amido black:
1. Make sure a QC check has been performed on the current batch of reagent.
2. Check an unstained area to insure the background will not be permanently stained. If the background becomes too dark, another staining procedure will need to be used.
3. Apply the solution with a rinse bottle to the item or to pertinent areas on the item.
4. Immediately apply the methanol rinse.
5. Apply the second water rinse.
6. Analyze latent prints developed and mark any latent prints suitable for comparison.
7. Photograph or digitally capture the latent prints.

14.3 Aqueous Amido Black Reagent preparation

A. Add the reagents in the order below to a lLbottle:

500 mL distilled water
20g 5-sulfosalicylic acid
3g Amido 10B black
3g sodium carbonate
50 mL formic acid
50 mL glacial acetic acid
12.5 mL Kodak "Photo-Flo"
Add distilled water to make a final volume of lL

14.3.1 Aqueous amido black procedures

A. This describes the procedure for applying aqueous amido black:

1. Make sure a QC check has been performed on the current batch of reagent.
2. Check an unstained area to insure the background will not be permanently stained. If the background becomes too dark, another staining procedure will need to be used.
3. Apply the solution with a rinse bottle to the item or to pertinent areas on the item.
4. The item can be rinsed with water, if necessary.
5. Analyze latent prints developed and mark any latent prints suitable for comparison.
6. Photograph the latent prints.

15.0 Leucocrystal Violet (LCV)

Note: Commercially prepared, purchased reagents may be used as long as the reagent has passed a quality control check.

15.1 Leucocrystal Violet (LCV) Materials and Reagents

A. The following is a list of chemicals used in preparing Leucocrystal violet (LCV) solutions:

1. 5-sulfosalicylic acid
2. 3% hydrogen peroxide
3. Sodium acetate
4. Leucocrystal violet (LCV)

15.2 Reagent preparation

A. Follow the steps below to prepare the Leucocrystal violet solution:

10 gram 5-sulfosalicylic acid
500 mL of3% hydrogen peroxide
3.7 gram of Sodium acetate
1 gram of Leucocrystal violet (LCV)

1. Dissolve 5-sulfosalicylic acid in hydrogen peroxide
2. Add sodium acetate and mix until dissolved
3. Add Leucocrystal violet (LCV) and mix until dissolved
4. Stir with a magnetic stirrer for 30 minutes
5. Perform a quality control check *(Expected results: violet color change and fluorescence)*
6. Store the solution in a dark colored bottle and refrigerate
   The solution should last for several months. Note: Do not use the LCV crystals if they are yellow instead of white. Obtain fresh Leucocrystal violet crystals.

15.3 Leucocrystal violet procedures

A. This describes the procedure for applying Leucocrystal violet:
   1. Make sure a QC check has been performed on the current batch of reagent.
   2. Apply the solution by:
      a. pouring it into a tray and immersing the item, or portion of item, into the solution, or
      b. using an aerosol or fine mist spray bottle to spray the solution on the item, or portion of item.
   4. Rinse the treated area with water if needed.
   5. Blot the area with a tissue or paper towel.
   6. Analyze latent prints developed and mark any latent prints suitable for comparison.
   7. Photograph or digitally capture the latent prints.

16.0 Sudan Black

Note: Commercially prepared, purchased reagents may be used as long as the reagent has passed a quality control check.

16.1 Sudan Black Materials and Reagents

A. The following is a list of chemicals used in preparing Sudan Black solutions:
   1. Sudan Black B
   2. 100% denatured ethanol
   3. Distilled water

16.2 Reagent preparation

A. Follow the steps below to prepare the Sudan black solution:
   15 grams Sudan Black B
   1 liter 100% denatured ethanol
   500 mL distilled water

   1. Place the Sudan Black B in an appropriately sized glass beaker
   2. Add ethanol and stir
   3. Add distilled water and stir

4. A black working solution will result (Note: Not all the Sudan Black B will dissolve; some will remain as particulate matter in suspension, or as sediment.)
5. Perform a quality control check *(Expected results: blue-black color change)*
6. Transfer the solution into a clean glass bottle and include all the solid material. This solution will last indefinitely.

16.3 Sudan black procedures

A. This describes the procedure for applying Sudan black:

1. Make sure a QC check has been performed on the current batch of reagent.
2. Shake the container of working solution and pour a sufficient amount into a clean and dry dish or tray.
3. Remove any metallic-looking film appearing on the surface of the working solution by drawing the edge of a piece of blotting or tissue paper across the surface before use.
4. Immerse the item in the working solution, or float the item on the surface for two minutes. For latex or vinyl gloves previously treated with cyanoacrylate, immerse in the solution for 15-30 seconds. For larger items, place the item in a large dish or tray and pour the working solution over the surface of the item.
5. Rinse item under cold slow running water until excess dye has been removed from the background. Use a wash bottle to rinse larger items.
6. Hang item up to dry at room temperature.
7. Pour any unused, uncontaminated working solution back into the original container, ensuring that all un-dissolved dye is also transferred.
8. Analyze latent prints developed and mark any latent prints suitable for comparison.
9. Photograph or digitally capture the latent prints.

17.0 Crystal Violet

Note: Commercially prepared, purchased reagents may be used as long as the reagent has passed a quality control check.

17.1 Crystal Violet Materials and Reagents

A. The following is a list of chemicals used in preparing crystal violet solutions:

1. Crystal violet
2. Distilled water
3. Ethyl alcohol
4. Tap water

17.2 Reagent preparation- Distilled water solution

A. Follow the steps below to prepare the Crystal violet distilled water solution:

.1 gram crystal violet
100 mL distilled water

1. Dissolve crystal violet in distilled water

2. Perform a quality control check *(Expected results: violet color change)*

17.3 Reagent preparation- Ethyl Alcohol stock solution

A. Follow the steps below to prepare the crystal violet ethyl alcohol stock solution:
1.5 grams crystal violet
100 mL ethyl alcohol

1. Dissolve Crystal Violet in Ethyl Alcohol

17.4 Reagent preparation- Ethyl alcohol working solution

A. Follow the steps below to prepare the crystal violet ethyl alcohol working solution:
2 mL Stock solution
100 mL of tap water

1. Combine Stock solution and tap water
2. Perform a quality control check *(Expected results: violet color change)*

17.5 Crystal violet procedures

A. This describes the procedure for applying crystal violet:
1. Make sure a QC check has been performed on the current batch of reagent.
2. Pour a sufficient amount of dye into a tray.
3. Immerse the item or adhesive side of tape into the dye.
4. Rinse the excess dye off the item under a trickle of cold running water into a tray to catch the run off.
5. Let the item air-dry.
6. Pour the remaining uncontaminated dye back into the bottle.
7. Analyze latent prints developed and mark any latent prints suitable for comparison.
8. Photograph or digitally capture the latent prints.

18.0 Sticky-Side Powder™

Note: Commercially prepared, purchased reagents may be used as long as the reagent has passed a quality control check.

18.1 Sticky-Side Powder™ Materials and Reagents

A. The following is a list of chemicals used in preparing Sticky-Side Powder™ solution:
1. Kodak "Photo-Flo" 200
2. Sticky-Side Powder™
3. Tap or distilled water

18.2 Reagent preparation

A. Follow the steps below to prepare the Sticky-Side Powder™ solution:

Kodak "Photo-Flo" 200
Distilled or tap water
Sticky-Side Powder™

1. Place 4 teaspoons of Sticky-Side Powder™ into a plastic weigh boat or shallow container
2. Add a 1:1 solution of "Photo-Flo" and water to the powder
3. Mix to the consistency of thick paint
4. Perform a performance check *(Expected results: gray deposit)*

18.3 Sticky-Side Powder™ procedures

A. This describes the procedure for applying Sticky-Side Powder™:
   1. Make sure a QC check has been performed on the current batch of reagent
   2. Brush the solution on the adhesive surface with a camelhair or soft brush.
   3. Allow to set for 10 to 15 seconds.
   4. Gently agitate in a bowl of water, or rinse under a slow stream of running water.
   5. Repeat the above steps if needed.
   6. Analyze latent prints developed and mark any latent prints suitable for comparison.
   7. Photograph or digitally capture the latent prints.

19.0 Interpretation/Reporting

19.1 Interpretation

The interpretation of the results of the application of these techniques is limited at this stage to the analysis of the latent prints developed and their suitability for comparison. Examination of the developed latent prints is outlined in FP005.

Diagrams and photographs indicating the location of a latent print and its relation to the surface or item may assist the analyst in determining the source and orientation of the print, as well as the placement and direction of the finger or hand relative to the item or surface. Caution should be used in interpreting any action taken during the placement of the print.

19.2 Reporting

A. Although not all encompassing, the list below provides possible wording for the reporting of processing results.
   1. If examining and processing result in the development of latent prints suitable for comparison, then the report may be worded:
      a. Examining and processing of the submitted items resulted in the development of usable latent prints.
      b. Examining and processing of the submitted items resulted in the development of latent prints suitable for comparison purposes.
   2. If examining and processing result in the development of latent prints that are not suitable for comparison, then the report may be worded:

a. Examining and processing of the submitted items did not result in the development of any usable latent prints.
b. The latent prints developed on the submitted items lack sufficient ridge detail for comparison purposes.
c. No latent prints suitable for comparison were developed on the submitted items.

3. If examining and processing result in no latent prints developed, then the report may be worded:
   a. Examining and processing of the submitted items did not result in the development of any latent prints.
   b. The submitted items were processed with negative results.
   c. No latent prints were developed as a result of the examining and processing of the submitted items.

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